COMPLETE LISTING OF THE CLAIMS

The following lists all of the claims that are or were in the above-identified patent application. The status identifiers respectively provided in parentheses following the claim numbers indicate the current statuses of the claims.

1. (Currently Amended) An image processing method comprising:

analyzing a plurality of ~~image~~ images of an object on a background that contains a plurality of separated marks, wherein for each image, analyzing comprises:

analyzing the image ~~of an object~~ to identify ~~a mark from among a plurality~~ one of the marks ~~in a background of~~ that in the image is separated from the object;

identifying locations of a plurality of calibration points on the mark identified; and

using the calibration points in determining camera parameters for the image; and

generating a three-dimensional model of the object from the images and the camera parameters determined from the images.

2. (Original) The method of claim 1, wherein the mark comprises a first rectangular segment having corners that are among the calibration points.

3. (Original) The method of claim 2, wherein the mark further comprises a second rectangular segment.

4. (Original) The method of claim 3, wherein the first and second rectangular segments make the mark L-shaped.

5. (Original) The method of claim 1, further comprising setting the object in a position relative to a sheet containing the background so that the background appears in the images of the object.

6. (Original) The method of claim 5, wherein setting the object comprises setting the object on the sheet.

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7. (Original) The method of claim 1, further comprising taking the images of the object using a camera having an unmeasured orientation relative to the object.

8. (Canceled)

9. (Original) The method of claim 1, wherein determining the camera parameters for an image comprises determining a transform from three-dimensional coordinates to two-dimensional image coordinates.

10. (Original) The method of claim 9, wherein generating the three dimensional model comprises:

identifying a silhouette of the object in a selected one of the images;

applying the transform for the selected image to three-dimensional coordinates of points from a candidate volume; and

constructing an approximate volume of the object from the points that the transform maps from the candidate volume on to the silhouette of the object in the selected image.

11. (Original) The method of claim 10, further comprising:

determining whether a three-dimensional model constructed from the approximate volume is suitable; and in response to the three-dimensional model being unsuitable,

determining a transform from three-dimensional coordinates to two-dimensional image coordinates in an added image;

identifying a silhouette of the object in the added image;

applying the transform for the added image to three-dimensional coordinates of points in the approximate volume; and

refining the approximate volume of the object to contain only points that the transform for the added image maps to the silhouette of the object in the added image.

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12. (Original) The method of claim 11, further comprising repeating steps listed in claim 11 until the three-dimensional model is suitable.

13. (Original) The method of claim 10, wherein identifying the silhouetted of the

object in a selected image comprises:

analyzing the image using software that distinguishes the silhouette of the object from the background; and

providing a user with a method for modifying of the silhouette as distinguished by the software.

14. (Currently Amended) The method of claim 1, wherein generating a three-dimensional model of the object comprises constructing a mesh of polygons that approximate the surface of the object.

15. (Original) The method of claim 14, wherein generating a three-dimensional model of the object further comprises providing a user with a method for modifying the mesh.

16. (Currently Amended) An image processing method comprising:

analyzing a set of images containing an object and a background to identify for each image a silhouette of an object and locations in the image of pattern points in the background;

for each image, using the locations of the pattern points to determine a transform from three-dimensional coordinates to two-dimensional coordinates in the image;

transforming three-dimensional coordinates of a set of points in a candidate volume to the two-dimensional coordinates of a first of the images; and

~~identify~~ identifying an approximate volume of the object as containing the points that the transform maps onto the silhouette of the object in the first of the images.

17. (Original) The method of claim 16, further comprising using the points in the approximate volume to construct a mesh of polygons that collectively approximate the surface of the object.

18. (Original) The method of claim 17, further comprising mapping a texture from the images to the polygons.

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19. (Original) The method of claim 16, further generating the candidate volume using the transform and silhouette for a second of the images.

Claims 20-27 (Canceled)

28. (Currently Amended) A reconstruction engine comprising:

~~a silhouette~~ an extraction unit capable of processing an image of an object on a background containing a plurality of marks that are separated from each other, wherein the processing includes identifying one of the marks that is separated from the object in the image, extracting a silhouette of ~~an~~ the object, and determining locations of ~~pattern marks from an image~~ calibration points on the mark identified;

a volume generator that receives the locations from the extraction unit, ~~location of the pattern marks in an image and~~ determines a transform for the image, and determines three-dimensional coordinates of points on a surface of the object from the transform and the silhouettes; and

a reconstruction unit that constructs a three-dimensional model of the object from the three-dimensional coordinates of the points on the surface of the object.

29. (Original) The reconstruction engine of claim 28, wherein the silhouette extraction unit and the volume generator are software.

30. (New) The reconstruction engine of claim 28, wherein the reconstruction engine is executable on a computer.

31. (New) The reconstruction engine of claim 28, wherein at least one of the marks comprises a rectangular segment having corners corresponding to at least some of the calibration points.

32. (New) The reconstruction engine of claim 28, wherein at least one of the marks is L-shaped.

33. (New) The reconstruction engine of claim 28, wherein at least one of the marks is asymmetric and an orientation of asymmetry in the mark identifies a reference axis.

34. (New) The method of claim 1, wherein at least one of the marks is asymmetric and an orientation of asymmetry in the mark identifies a reference axis.

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35. (New) The method of claim 16, further comprising selecting the candidate volume based on a position of the silhouette relative to the pattern points in one of the images.

36. (New) The method of claim 35, wherein the candidate volume initially comprises all points having coordinates x, y, and z such that each coordinate x, y, or z is within a corresponding range.

37. (New) The method of claim 35, further comprising identifying boundaries of the corresponding ranges of at least one of the coordinates based on the position of the silhouette relative to the background in one of the images.

38. (New) The method of claim 16, further comprising:

setting a current candidate volume equal to the approximate volume;

transforming three-dimensional coordinates of a set of points in the current candidate volume to the two-dimensional coordinates in a next of the images; and

identifying the approximate volume of the object as a minimal volume containing the points that transform onto the silhouette of the object in the next of the images.

39. (New) The method of claim 38, further comprising repeating the steps of claim 38 one or more times.

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